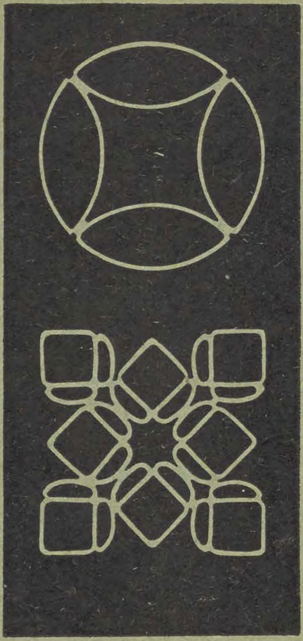
UNIT JEWELLERY

A HANDBOOK IN SIX PARTS

BY R. LL. B. RATHBONE

VERY FULLY
ILLUSTRATED
THROUGHOUT



EACH PART
MAY BE HAD
SEPARATELY

CRAFTSMANSHIP
WITHOUT DESIGN
IS LIKE A VESSEL
HAVING NO PILOT

PART
III

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UNIT JEWELLERY

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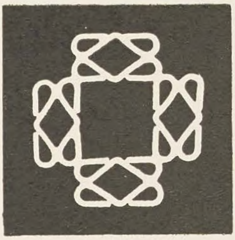
VEL E MINIMIS PULCHRITUDO



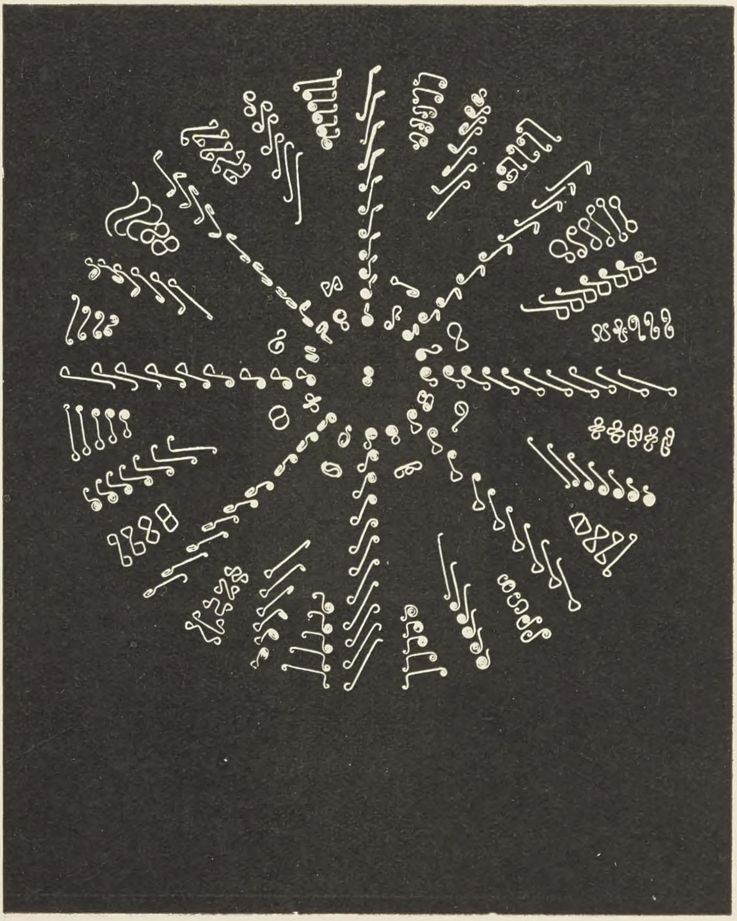


FIG. 14A.—Units of the "S" type.

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UNIT JEWELLERY

A HANDBOOK FOR CRAFTSMEN
IN SIX PARTS (SOLD SEPARATELY)
ILLUSTRATED WITH MANY
DRAWINGS BY THE AUTHOR
AND WITH A PROFUSION OF
PHOTOGRAPHIC SILHOUETTES
OF ORNAMENTS AND DETAILS
MADE BY HIM FOR THAT PURPOSE
AS ALSO WITH PHOTOGRAPHS OF
TOOLS AND OF SOME EXAMPLES
OF JEWELLERY SELECTED FROM
NATIONAL & PRIVATE COLLECTIONS

BY R. LL. B. RATHBONE

PART III

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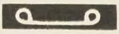
73. Designs made by grouping repetitions of  . 167
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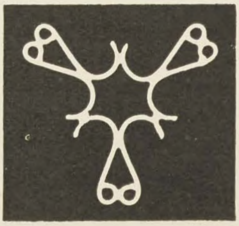
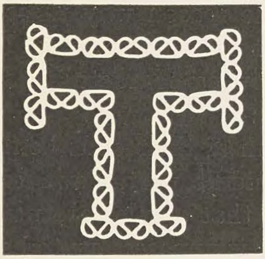


CHAPTER XXII

FIVE CHARACTERISTIC TYPES OF UNIT



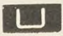
THE question whether or not to adopt $\frac{7}{8}$ inch as the length for your wires should not be decided finally until after having made some more experiments on similar lines to those described in Chapter XIX.

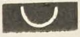
In order to make that decision on a sound basis, you must first acquire enough ability in handling your pliers to enable you to judge what they *will* do, and you must also find out, by making experiments, what are the things that you want them to do and how you can make them do these things. Perhaps the best way of acquiring this knowledge is to deal with all three points together in the reverse order, that is to say, to try and make the pliers do what you want them to do, in order to learn by experience what they can and will do.

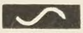
First, then, we have to decide what things we *want* the pliers to do.

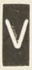
Each craftsman is likely to have preferences for certain shapes, and that is a sound basis to start upon ; but there is another one, too, which consists in the fact that all the forms which can be made by bending short lengths of wire seem to fall naturally into one or other of five fairly distinct varieties, and that what can be done with these forms depends largely on the tools that happen to be available.

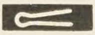
So the first thing we want the pliers to do is to make a few specimen units, chosen according to the individual preference of the craftsman, from each of the five varieties, which it is convenient to describe as :—

The " staple " type .

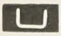
The " crescent " type .

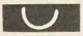
The "S" type .

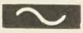
The "V" type .

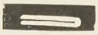
The "cotter-pin" type .

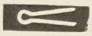
It should be realised at once that these names are not meant to suggest that very many of the units belonging to any one of these types will strongly resemble the form which the name in question describes, but the reason why these names have been chosen is simply that each name seemed to express one or other of the five following characteristics of those types fairly well and concisely :—

(1) Units of the staple type have both of their ends bent upwards, while *some* portion of the middle part, however small, remains flat . It is true that staples are not always flat in the middle, but perhaps it is unnecessary to be so very precise.

(2) Units of the crescent type have both of their ends bent upwards, while *some* portion of the middle part, however small, remains a hollow curve between the two bent ends .

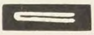
(3) Units of the "S" type have one of their ends bent upwards, but the other one is bent downwards .

(4) Units of the "V" type have all been doubled over so that the two ends come together , and whenever, as frequently happens, this double-over bend is at all opened out, then a more or less V-shaped angle results.

(5) Units of the cotter-pin type, at one period of their formation, have all of them assumed the shape of a cotter pin , but the central loop of this unit need not be of any particular size or shape. Any unit in an early stage of whose formation a central loop of some sort had to be produced, by bending the ends of the wire together around something which gave the loop its shape, is regarded as belonging to the cotter-pin type.

Although these trial specimens should satisfy as far as may be the personal fancy of each craftsman, he should, none the less, *limit* himself for the present to the simpler forms, but there is no harm in consulting Figs. 14 and 14A in order to realise better what the possibilities are in two, at least, of the different types.

As soon, however, as the actual formation of units is begun, the book should be closed and put aside, and all temptation to *copy* particular forms should be resisted. On the other hand, if the pliers seem to produce very familiar forms of their own accord, that is another matter, and any such tendency should be allowed free play—only the mind should always be ready to seize any idea of variation that may be suggested by the operation.

Some hints as to the best way of making units of the " V " and of the cotter-pin type may be helpful. For many of these units it is highly important that the bend or the loop should come accurately in the middle of the wire, and *all* the units in Fig. 14c, without exception, were first doubled in half, thus  ; and before anything more was done, they were *annealed*, because otherwise they would have been very likely to break in two later on.

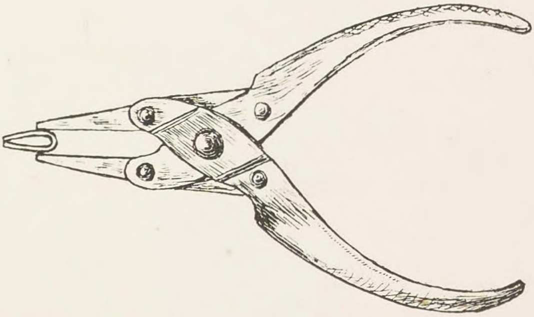
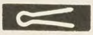


FIG. 43.—Beginning the second stage in making a unit of the " V " type with Bernard flat-nosed pliers.

" Parallel " pliers make the operation of doubling over easier and more satisfactory than the old kind.

First grip one of the $\frac{7}{8}$-inch lengths of wire with your larger round pliers at as near the middle of the wire as you can guess, and pull the ends of the wire round until they meet and form a loop .

Then hold the big part of the loop between the flat faces of your *Bernard pliers,* [or, failing these, of a pair of ordinary flat or even snipe-nosed pliers,] as in Fig. 43. Now give a gentle squeeze with the pliers, watching the ends of your wire carefully to see if they keep level with each other. If one end shoots ahead of the other, just alter the grip of the pliers slightly until this is corrected, and finally close the pliers firmly together to complete the double-over bend.

The same recommendations apply to units of the cotter-pin type, for all those illustrated in Fig. 14D were first bent thus , and then annealed.

The first stage in making the cotter-pin type of unit is the same as that for the V shape, except that the smaller round-nosed pliers will generally be used. Retain the loop of the wire in the grip of the round-nosed pliers while the ends of the wire are closed together with the Bernard pliers, as shown in Fig. 44.

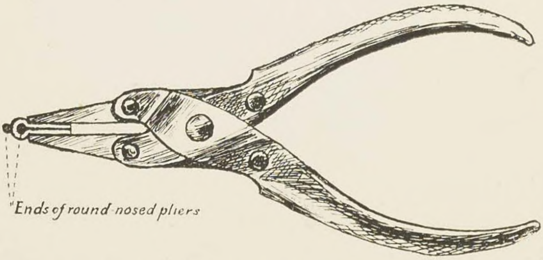
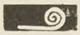
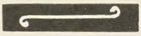


Fig. 44.—The second stage in making a unit of the cotter-pin type with Bernard flat-nosed pliers.

In the above illustration all that is shown of the small round-nosed pliers is the end view of the two "points," one of which forms the inside of the loop.

When choosing the style of the units which are to constitute your trial examples of the five main types you will do well to exclude for the present all of those forms into which closely-scrolled ends  enter. It will be soon enough to begin making some of these after reading Chapter XXIV.

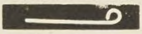
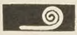
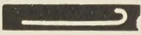
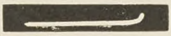
Some detailed advice is given in that chapter in regard to the formation of these scrolls, because it is not very easy to make them well, and it will be better not to anticipate this. These remarks apply, not only to those scrolls which have several turns, but even to , because it is in skilfully making the beginning of the scroll that the difficulty is greatest.

CHAPTER XXIII

LOOPS AND SCROLLS

Without any use being made of scrolled ends, there still remain a great many other forms to choose amongst, and these other forms will, moreover, provide a test of the amount of variety in bending which you can get with your pliers—a test that is much wider in scope than that which the scroll treatment would afford, as we shall see directly from a very interesting point of view which now calls for our attention.

When you have made what we may call the " body " of the unit—that is to say, a form similar to any of the typical units on p. 110, or any development of those forms so long as one or both of its ends are left plain—the next step is to experiment upon these units or bodies of units which you have made, in order to discover what choice there is at your disposal for your treatment of the ends of the wires.

The end of a wire may be treated in one of the following ways, that is to say, with a loop  or with a scroll , or with an incomplete , or merely rudimentary  formation of either loop or scroll.

Deferring consideration of the scrolled end for the moment, Figs. 45 and 46 show that, in ends treated with loops and partial loops alone, the choice—theoretically—is very extensive.

The degrees of variation between one form of loop and another one which is nearly related to it, as represented in these shadow prints, is in each case quite arbitrary, and several instances will be noticed where the variation might

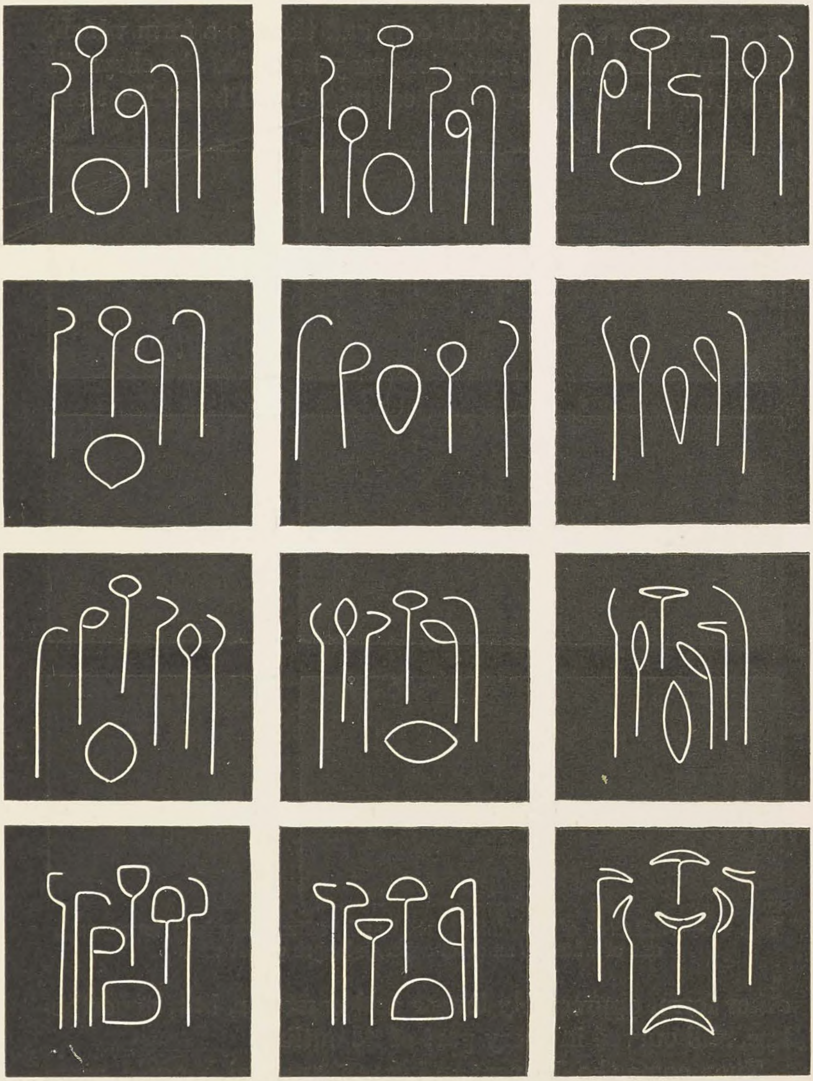


Fig. 45.—Variations of complete, partial, and rudimentary loop forms, each one of which is made from a $\frac{7}{8}$-inch length of flat wire.

have been either greater or less, or both. Beginning with the circular formation, there is room to include the orange shape before we come to the oval and then to a form which, for want of a better description, may be called the chrysalis or beetle form. After this there might well be at least one other form, appreciably longer and narrower, but, nevertheless, still curved in every part of its outline.

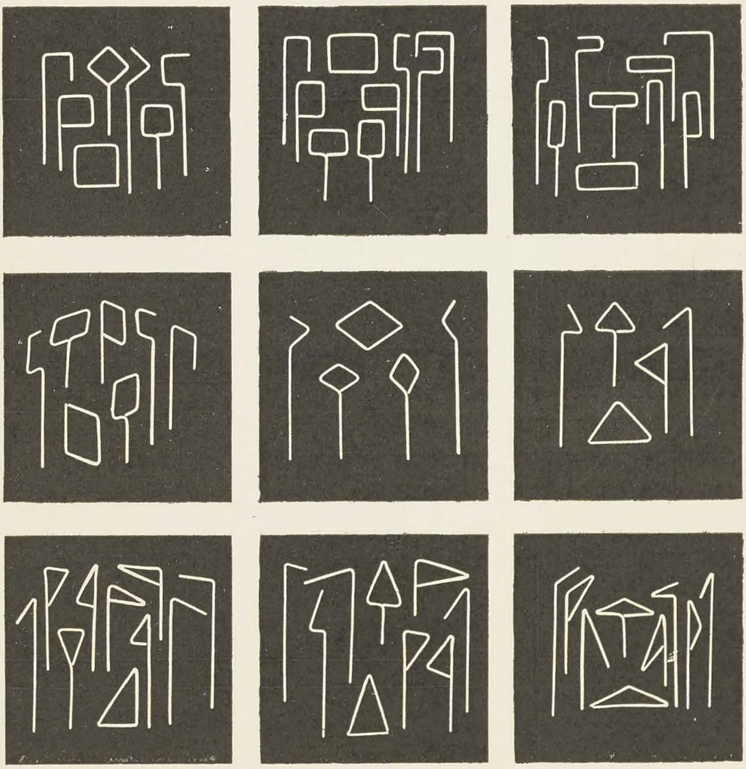


Fig. 46.—Variations of complete, partial and rudimentary loop forms, each one of which is made of a ⅞-inch length of flat wire.

Then come the fig, pear and tear shapes, with, again, room for a fourth variation. This latter family might, further, lead to a variation based on the form of those birds' eggs which are perceptibly more pointed at one end than at the other, while yet their contour line is everywhere curved.

Next we have the lemon shape, the leaf shape and the fish shape, with room for, perhaps, three other variations, one of which might be called the shuttle shape. Again, it is easy to imagine several minor variations on either side of the " D " and the half-moon shapes respectively. The same idea might be pursued through all the other possible variations of loop forms, whether triangular, four-sided or polygonal, so as to add up to a remarkably large total altogether.

It is obviously quite true that many of these variations are not really practicable on the scale which has been recommended for unit jewellery—a scale not really suitable to the expression of sharp angles and very slight differences in the curvature and direction of lines. None the less for that, however, it is probably safe to assert that there is no variation of the kind indicated above, however subtle it might be, which would not be perfectly realisable, and capable, too, of producing interesting and characteristic patterns under favourable conditions. That is to say, for some other kind of decoration of a kind and on a scale more suitable to the expression of sharp angles and of very slight differences in the curvature and direction of lines. That last sentence might be taken to suggest that the more difficult and subtle of these variations could only be used satisfactorily in work of large scale. But that is not true either, for, even on the scale on which they are illustrated, these forms are perfectly appropriate to *cloisonné* enamelling.

So much so that, after I had prepared some specially thin flat wire with which to make models of them, as soon as I began to work it, I realised that this was a *cloisonné* enameller's job, and that he would make them much more perfectly than I could hope to do. And so, through the courtesy of Mr. Harold Stabler, these little forms (Figs. 45 and 46) were made for me from my pencil sketches * by Mr. S. Kato, under Mr. Stabler's direction.

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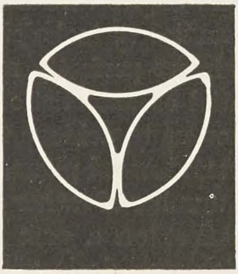
* This, and the similar instance referred to on p. 140, are, I believe, the only cases where drawing had anything to do with either the units themselves or with designs made with them and illustrated in this book.

Similarly, in fine filigree jewellery (where the conditions are so nearly similar to those of *cloisonné* work), elements of design which depended for their effect on such niceties of outline as those which we have been considering would be entirely proper, and there would be no reason why they should not be used in the form of units, either separately or in clusters. Nor, indeed, is there any reason why an experienced craftsman should not build up designs for jewellery out of units made of *plain* flat wire of similar thinness to that which, with a beaded edge, is used for filigree work.

But units made of wire of the section recommended on p. 85 would not be susceptible of more than just a few of the variations represented on pp. 115 and 116, because wire of that thickness is not capable of being bent so as to show a *sharp* angle. Also, the thickness is too great in proportion to the ⅞-inch length to permit of more than a comparatively small variety of forms being produced. If, however, the wire used for each example was of such proportions that its length and thickness would have a mutual relationship similar to that which obtains in Figs. 45 and 46, then any of the forms which are there shown could be expressed just as well as they appear in those illustrations.

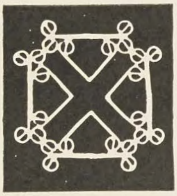
This little exploration of the possibilities offered to the designer by variations in loop forms for the ends of his wires helps to substantiate an impression previously somewhat vaguely felt or suspected, namely, that there really are *more* than five main groups into one or other of which all bent-wire units must fall. For which of those five types shown on p. 110 would properly accommodate any of these loop forms except, perhaps, those of them which are "complete" without leaving any ends at all? And, furthermore, would it not be more logical to say that all those units which have *no* ends belong to the endless type? The others might, perhaps, be said to belong to the tadpole, frying pan, walking stick, butterfly net, shovel, golf club, battle axe, or domestic chopper type! In short, let us say the seventh type.

Now pick out from Figs. 45 and 46 the forms which you like best, and try how far, with a reasonable degree of ease, you can manipulate the ends of some of your units so as to reproduce such forms, rejecting all those which are so difficult as to be unsuitable for frequent repetition.



CHAPTER XXIV

HOW TO MAKE CLOSE SCROLLS



Even now a few more experiments should be made before it is possible to make a wise decision as to whether or not to adopt $\frac{7}{8}$ inch as the standard length for your wires. The reason why will be apparent presently, and the next thing to be done is to practise rolling up the ends of some of the wires into close scrolls, as shown on the next two pages, having first curled them round through two right-angles with the round-nosed pliers. It requires a lot of practice to make close scrolls perfectly, and unless they are almost perfectly made they will never look well, their essential characteristic being that they are *curled*, not *bent*. In order to achieve this, the preliminary curl, given with the round-nosed pliers, must now be closed in *very gradually* by a number of rather gentle squeezes, each one of which takes effect on a part of the wire slightly different to that which was dealt with by the preceding squeeze.

The pliers represented in the illustrations are ordinary short snipe-nosed or chain pliers with square ends, but later experience has shown that the curling can be done quicker and better with a pair of Bernard flat-nosed pliers. The parallel action of the jaws and the greater power which these pliers give the craftsman enable him to accomplish this rather difficult little process more easily than with the ordinary pattern. However, even if you have a pair of Bernard pliers which will replace the ordinary flat-nosed ones, you will certainly need for many units a pair of blunt snipe-nosed pliers also ; and if you could not buy any with blunt ends, then select a pair whose ends are the least pointed, and gently rub the ends on a piece of F.F. emery cloth while this is stretched over the *flat stake,* until the flattened ends

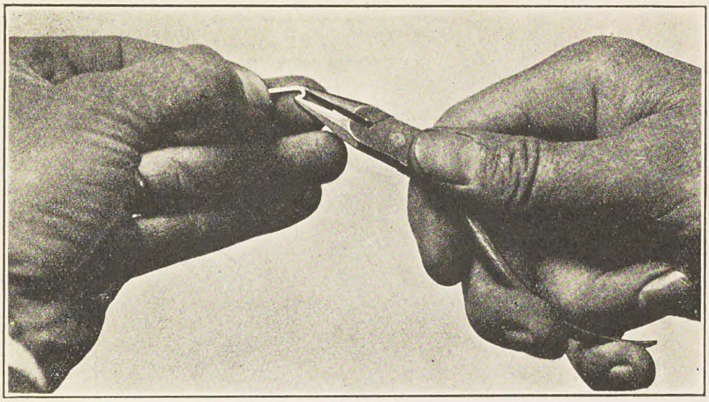


FIG. 47.—Curling flat wire into a close scroll.

measure $\frac{1}{16}$ inch across. To do this the closed pliers must be held quite vertical, so that the ends may be ground square

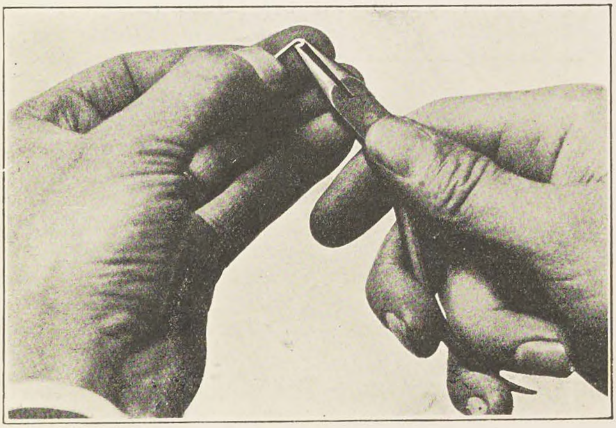


FIG. 48.—Curling flat wire into a close scroll.

and true. Very little pressure will be required, as the emery cloth cuts keenly.*

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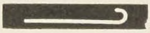
* A carborundum—or, still better, a fine India-stone—slip (or file) is an improvement on emery cloth, and is very useful for many little jobs. Use paraffin, or, if you have it, "stonoil," with these stones. An emery grinder is of course, better still.

And now, assuming that you have prepared a number of wires by curling one end with your small round-nosed pliers so as to produce , then, in order to close in these open curls and to convert them into neat close scrolls, the first squeeze (Fig. 47) must reduce the size of the outer half of the curl, so that the end begins to turn towards the straight part of the wire, after which it will be found possible at the next squeeze to grip a smaller bit of the end of the curl until it is almost doubled round, and the closing in of the extreme end is completed at the following squeeze (Fig.

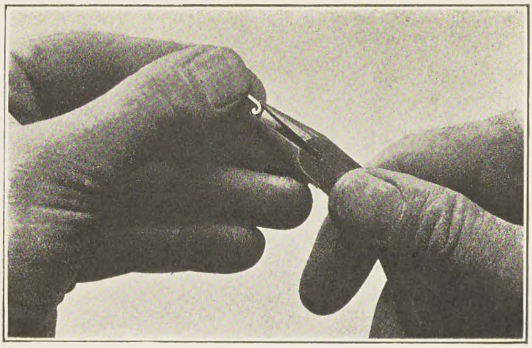


Fig. 49.—Curling flat wire into a close scroll.

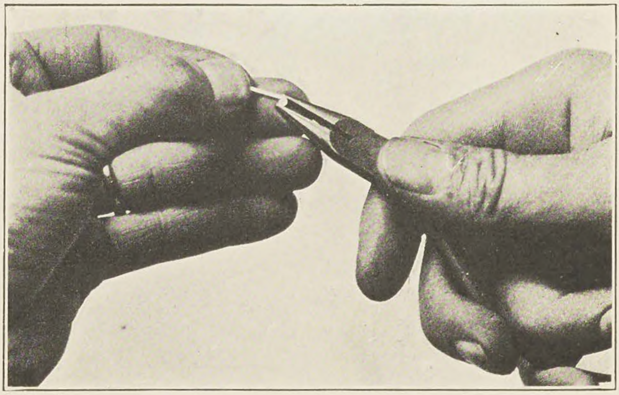


Fig. 50.—Curling flat wire into a close scroll.

48), when a still smaller bit is gripped. The end of the wire should then appear as shown in Fig. 50.

These first stages are the important ones, and if they are successfully accomplished, any further scrolling is easy. But the danger is that, if you exert a very little too much pressure at first, the wire will bend instead of curling, and then your scroll will be hunchbacked.

In order to avoid this danger, each of these early stages must in reality comprise several distinct squeezes, and for each squeeze the position and grip of the pliers must be very slightly varied. Thus, to alter the end of the scroll from the form shown in Fig. 47 to that represented in Fig. 49, there should be three distinct stages, after each one of which the scroll is gripped with the pliers afresh, and each time it must be a slightly smaller piece of the curl which is gripped.

When the squeeze, for which Fig. 49 shows the preparation, is exerted, it will be observed that it has the effect of causing the scroll to roll itself up tight into the form shown in Fig. 50, after which any further curling that may be desired is done by gripping the scroll as shown in that illustration, and then by pulling the pliers round towards the left hand while the rest of the wire is securely held between the left thumb and forefinger.

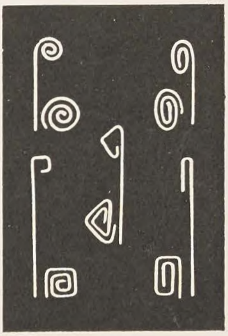
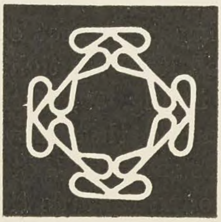


Fig. 51.—Variations in scrolls.

When you have succeeded in starting a few scrolls without "breaks" or sharp bends, continue the curling until the wire is completely rolled up into a neat coil. This will prove how far the first stages were successful, for the finished coil cannot look perfect unless it was begun right, and you will be able to see at once whether the line that divides one fold of the wire from the next to it is of even width throughout its length.

It is now time to try how many different ways of dealing with an end of wire are provided by the process of scrolling, and here it will be found that the variations which this process makes possible are extremely limited, and that they are not in any way comparable in number with those which are based upon the idea of forming something in the nature of a loop.

In spite of that fact, however, it is probable that the formation of scrolls at the ends of wires is one of the most important of the processes used in making units.



CHAPTER XXV

SOME SPECIALLY USEFUL UNITS

In order to appreciate the importance of this scrolling process, on which so much stress has been laid, it may be worth while taking a good look at Fig. 14A, examining any of the units which take your fancy, and then considering how many of them there are which do not at all depend for their form on this process.

Personal preferences will, of course, always vary in these matters, but the fact that considerably more than half of the units in this illustration have either one or both of their ends curled into at least the beginnings of spiral scrolls appears to indicate that this is among the most important of any of the bending processes which we have at our disposal.

It is very probable that, in making the scrolls, you will have found that the roughened surfaces of the pliers with which you have gripped the wires have marked these in an ugly way. If so, it will be necessary to take off a little of the roughness by rubbing the inner faces of the pliers with emery cloth.* But be very careful not to make them *too* smooth. Take off very little at a time, and keep trying the pliers until you find that they will grip the curled wires securely enough to make the scrolls without too great a tendency to slip off, and without marking them overmuch. At their back or inner part, near the joint of the pliers, these faces should be *quite* smooth, and (unless you are lucky enough to have a pair of flat-nosed *parallel* pliers) it is with these broad smooth parts of the snipe-nosed pliers that the forms you make by scrolling and bending can most conveniently be " set " flat when, as frequently happens, some parts project beyond the rest sideways.

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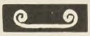
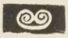
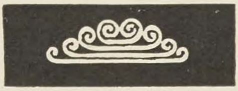
* Or with a carborundum, or fine India-stone, slip and paraffin. Fine India-stone and paraffin will cut "glass-hard" steel, but of course only very slowly.

When the scrolling or bending has been completed, the forms made may be laid down on the polished steel stake (Fig. 26, B) or some substitute * and tapped lightly with the polished face of the hammer, in order to " set " them more effectually and to give what is called a " planished " surface to the edges of the wire, which have now become the upper and under surfaces of the units that have been constructed. But the planishing must not be overdone, because it will be repeated after the units are soldered together. They will usually be " spread " by the planishing, and will want a little closing up and adjusting with the pliers afterwards each time they are set.

And now, at last, we are in a position to make the final tests as to whether $\frac{7}{8}$ inch is a suitable length. These tests depend on an ability to make and successfully. We have already seen that it is much more difficult than most people would expect it to be to induce an end of wire to *curl* up on itself rather than to *double* over, but a fairly close approximation to a true curl is so essential to the proper formation of large numbers of very attractive units as to appear to justify some straining of the reader's patience by so repeatedly emphasising this point. In making the extreme ends of the wire should be turned through three right angles. Turning each of the ends through four right angles gives us ; through five gives  ; while to obtain  we must turn the ends through seven right angles. If this series of four units will " nest " together, that will be a great help in building up designs, and it also seems to be a fair indication that the *length* of wire selected bears a due relation to its own *thickness*.† But in order to decide whether the length of wire is appropriate to the *pliers* which you have at your disposal



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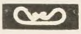
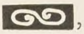
* See pp. 71, 72.

† See note on p. 102.

there are just two other units,  and , which constitute a very perfect test of fitness in this respect.

They will be seen to be derived from and respectively; they are both of them very useful forms, and neither of them will be satisfactory unless the pieces of wire from which they are made have been cut to that precise length which ensures the curled ends coming into their proper relative positions when manipulated, as described below, by means of whatever small round-nosed pliers you may happen to have.

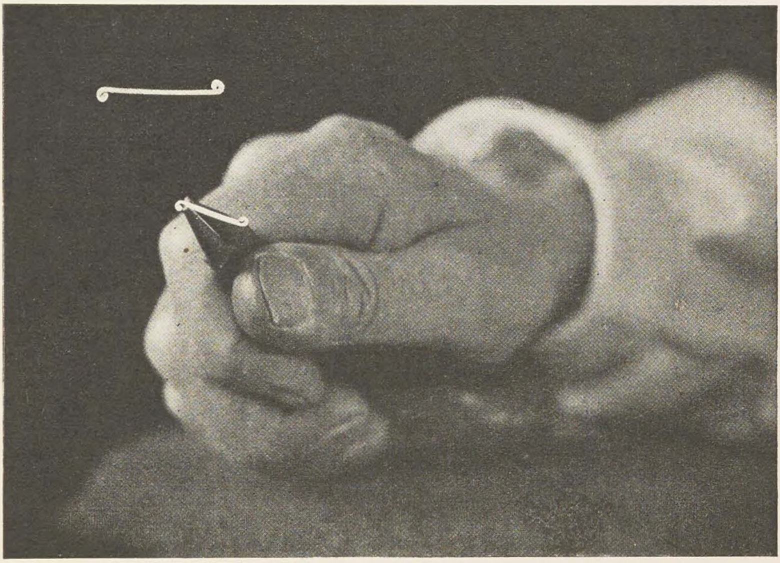
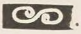


Fig. 52.—Gripping the partly-made unit in order to form one loop of .*

In order to make either of these units, after the ends have been scrolled, the wire must be gripped between the tips of a pair of small round-nosed pliers, one of the tips coming *just behind* the scrolled end of the wire, but close up against it (Fig. 52); and then the projecting part of the wire must be bent round until that one of its two scrolled ends which is nearest to where the wire is gripped is brought into contact with the straight part of the wire, a loop having been formed around one point of the round-nosed pliers in consequence (Fig. 53).*

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* Note.—In Figs. 52 and 53 the hands are supported in the way that is shown solely in order to prevent accidental movement while the photographs were being taken. The process of bending would usually be best done without any support for the hands, but only for the elbows.

The manipulation is very similar for both these units, but the photographs show the process as applied to the formation of ∽, because in the second position (Fig. 53) it is helpful to see the method by which that part of the bending is done, which, after the second half has been bent similarly (but this time against the steel stake instead of against the thumb), forms half of the slanting part in the middle of this unit. It is of the utmost importance for the success of the unit that this slanting part should be long enough, but only *just* long enough, to allow the straight parts of the wire which

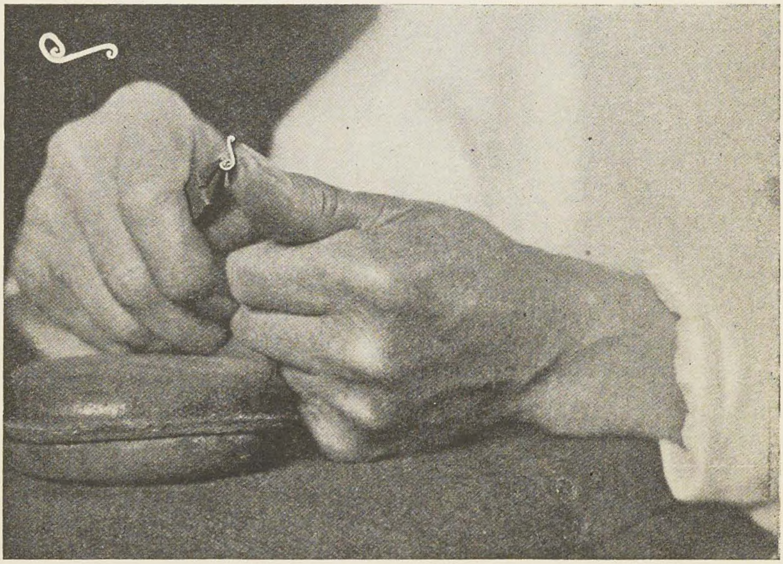

FIG. 53.—Completion of one half of the bending process which is necessary in order to produce ∽.*

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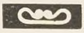
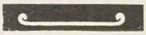
* NOTE.—In Figs. 52 and 53 the hands are supported in the way that is shown solely in order to prevent accidental movement while the photographs were being taken. The process of bending would usually be best done without any support for the hands, but only for the elbows.

form the top and bottom of the unit to come parallel and lineable one with another.

So also, when making , it is obvious that, after the ends of the wire have been curled round thus , the part which has been allowed to remain straight must be just long enough to allow the ends to be bent back until they touch the straight part *and* each other, but it must *not* be long enough to leave any gap between these ends after the bending has been finished.

Also, it is clear that while a $\frac{7}{8}$-inch length may give just the right amount of wire for making either one of these two units which we are now considering with one particular pair of pliers, that same length cannot possibly be quite right for another pair of pliers whose tips are slightly thicker or thinner. And in this connection it is well to say that the two tips of a pair of round-nosed pliers will very rarely be quite identical in size, and so it is a good plan to file or punch a mark on *one* handle, near the joint, so as to be sure of always using the same tip to form the inside of a loop.

CHAPTER XXVI

CONSTRUCTION WITHOUT SOLDERING

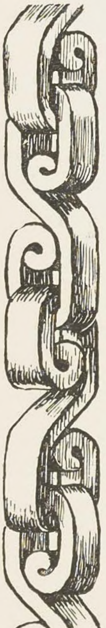


FIG. 54.—An enlarged view of a length of chain made of repetitions of .

THE title of this chapter is one which has only been adopted with a due and proper fear of the possible consequences. Not, however, without some hope that no reader who, whether from curiosity or from interest, follows the next few pages attentively, will do me the injustice of imagining that I wish to advise the production of unsoldered jewellery.

By no means. Occasions on which soldering may be omitted altogether are very rare indeed, and the sound judgment which results from long experience is your only safe guide as to when the omission is permissible.

But the object of the title, and of these pages which treat of it, is to demonstrate that there *are* certain kinds of unit jewellery work in which the soldering *may*, and sometimes even *must*, be done *after*, instead of, as is most usual, simultaneously with, the construction. And that is only another way of saying that in these particular jobs the *construction* itself *is* done without soldering. But soldering has got to be done afterwards, though not necessarily by the same person who did the construction.

Nor is all this emphasis laid on the fact that construction may at times properly precede soldering, without a good and sufficient reason.

As a pleasant, interesting and moderately remunerative occupation for any one who wishes to be doing something with his hands, especially when it is something that provides ample scope for the imagination, too, unit jewellery has much to offer, but sometimes it may happen that anything which absolutely depends on silver-soldering and all that that implies will present obstacles which may be nearly or quite insuperable.

In another chapter something is said about the great variety of different processes which go to make up the entire craft even of *unit* jewellery, so as to indicate the opportunities thereby offered for the play of co-operative methods. It is there pointed out that even the formation of units may sometimes be regarded as an occupation in itself, and that the designing of patterns by the method of arranging units in groups offers unlimited scope for taste in the selection and in the association of forms, as well as for invention and for original treatment. Moreover, in so far as producing designs by arrangement goes, this scope is offered without of necessity calling for more than very slight physical exertion, nor for any workshop equipment beyond a supply of units and a pair of tweezers, so that it seems peculiarly suitable as an occupation for invalids and convalescents.

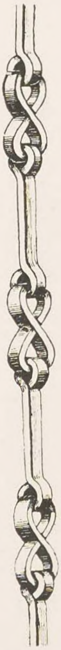


FIG. 55.—Chain made of repetitions of ∞ and o—o.

A chapter is also devoted to methods of recording designs made in this way, so that while the units are released for use in fresh experiments the designs produced can be preserved for future use.

But there may be invalid readers and others to whom the idea of *constructing* something makes a strong appeal, in spite of which, for one reason or another, they are denied the satisfaction of carrying their ideas through *all* the various stages and processes necessary to the production of finished ornaments. Such readers may like to know that, so long as they have a supply of suitable wire cut up, let us say, into the lengths which they intend to use, they can very soon learn how to make from these bits of wire strong and pleasant-looking chains of many different patterns, and that all that is required to complete these chains is that they should afterwards be soldered and polished, which may, of course, if necessary, be done by some one else.

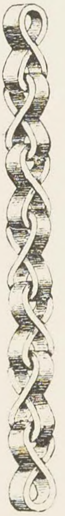


Fig. 56.—Chain made of repetitions of ∞ only.

Interesting constructive work of this kind can be done with nothing more than a few pairs of pliers, a light hammer, and some smooth solid surface on which to "set" the links. Nothing more is really needed for the actual construction — no bench, no blowpipe, no other tools.

The soldering and polishing may be done later on.

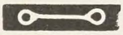
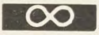
Fig. 54 on p. 130 shows how, by making a number of repetitions of one of those two units which engaged so much of our attention at the end of the last chapter, these may be associated together constructionally to form a strong and decorative chain.

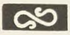
In this illustration, as well as in several others in the present chapter, the drawing has been made on an enlarged scale, so as to express the formation and construction as clearly as may be.

But, as we have already seen, it is a matter of some difficulty to curl the ends of a wire neatly into a well-shaped close scroll, and so it will be best to begin with those chains whose links have no close scrolls.

Fig. 55 is an easily-made chain which is composed of the two very simple units which are shown beneath it.

If you have the means of soldering at hand, it will be best to solder the loops of the long links while these can be dealt with separately, because that is easier, and the danger of the solder running in such a way as to attach two links together is minimised. But with practice it will be found possible to solder loops without allowing them to stick to adjoining parts, even when the space between is very much smaller than it is in this chain.

If two of  are linked to *each* loop of , then a twin chain will be produced rather similar to Fig. 58 on p. 134, or if nothing but the small figure-of-eight unit is used, in that case you will get a pleasant, strong and flexible pattern (see Fig. 56). A beginner can hardly do better than make a length of this figure-of-eight chain as a first exercise in the simplest kind of construction.

A further variation is obtained by linking this same figure-of-eight unit and  alternately (Fig. 57).

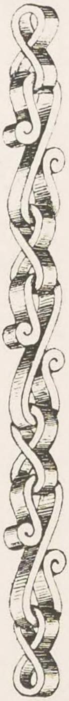
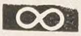
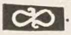


FIG. 57.—Chain made of repetitions of  and .

Great care should be taken in curling the ends of the wires which form the longer of these two links, as explained on pp. 120—123, and before this pattern of chain is put into use these scrolled ends *must each of them* be exceptionally well soldered to the other part of the wire which they touch, because they will obviously be rather liable to catch in any open kind of material when worn, and they must be strong enough to resist a sudden pull. A small spherical grain soldered in the outer nick formed by each of these scrolled ends would make the chain less likely to catch.

That liability to catch does not apply to Fig. 54, p. 130, where the scrolled ends are all turned inwards, but then this is a pattern which requires rather more skill if it is to be well made. By using wire in longer lengths, greater variety is obtainable, and the recommendations as to keeping strictly to one length of wire *do not apply to chain-making.*

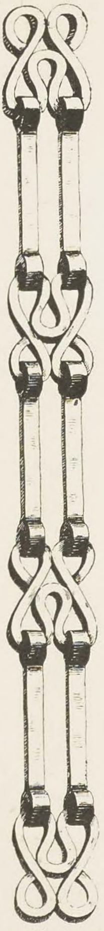
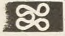
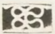


FIG. 58.—Chain made of repetitions of and .

 is an excellent link to use in making a twin chain such as Fig. 58, and it is not particularly difficult to make when once you have found the correct length * of wire relative to the pliers which you are using. The first stage is the making of a loop exactly in the middle of the length of wire, as shown on p. 112.

This link performs the useful service of keeping the twin long links in their proper positions, not only longways, but also sideways, which is very important, and the chain made with it (Fig. 58) is rather less likely to get into kinks than some other patterns.

Any chain in which there are twin links will naturally have to be made with greater care and accuracy than is necessary for a similar chain made "single," or else it will never hang true.

In Fig. 59 another element of variety is introduced, because the loops of each link are twisted up so as to come at right angles with the general lie of the link, the form of which will be better understood by comparing the front and side views. It is first made thus 8⊃, and the loops are then twisted round, one at a time, in opposite directions, each loop through one right angle.

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* See note at the end of this chapter.

An example of the use of this link, or, rather, of a link which is very similar to it, in combination with two others is shown in Fig. 61, and it will be seen at once that a considerable degree of variety is possible, according to the length of wire which is used in its construction.

At first sight it may not seem easy to trace any near connection between Fig. 62 and Fig. 59. But the interlaced link in Fig. 62 was derived directly from, and, indeed, it was suggested by, the experience gained in making the links for Fig. 59.

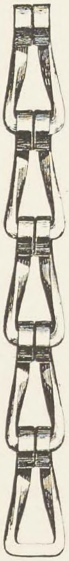


Fig. 59.—Chain made of repetitions of ⊂8 (modified).

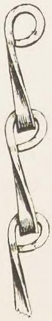


Fig. 60.—A side view of part of Fig. 59.

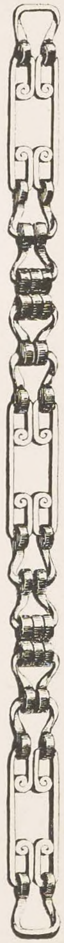


Fig. 61.—Chain made of repetitions of ⊂8 (modified), ∞ and ⊂—⊃.

There must certainly be many other forms of link discoverable for use in making chains, and even with those already illustrated there are many other possible combinations and variations which offer scope for ingenuity and experiment.

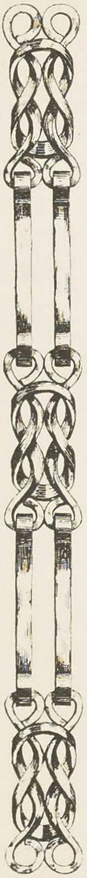
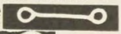
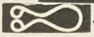
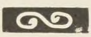


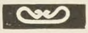
Fig. 62.—Chain made of repetitions of  and .

No use has been made in these examples of plain rings, whether circular or oval, and the addition of these would at once open up a number of fresh arrangements.

Moreover, with the help of small rings, some of the simple units, such as the figure-of-eight, can be linked together sideways as well as endways, and in that way purses and bags may be constructed. But then, of course, the subsequent soldering may be a really difficult and complicated job.

It may be objected that this discussion about chains constructed without soldering has come as an interruption which has disturbed the consideration of the exact length to which the wire for making units should be cut. And the fact is that it did actually come as an afterthought, but it appeared to be so appropriate to the special purpose for which much of the present edition has been designed as to demand inclusion even after the book had been considered finished.

This afterthought was suggested by , and that is the reason why the pages dealing with it were inserted immediately after the passage in which the formation of that unit is described.

 can also be used for making a chain, either on the principle adopted for Fig. 61, p. 135, or with the help of

small round or oval links, and it forms the basis of two among the other chains which are illustrated in a later chapter. Altogether it is a peculiarly serviceable unit, whether it is used alone or in conjunction with others, as will be seen from many of the patterns which are illustrated in this book. Some of them show how strongly individual a character may distinguish designs which are built up out of repetitions of this one unit without the help of any others. This individual character will be seen to depend largely on the contrast between the straight part of the unit and its other parts, which are bent in such a way as to form an ornamental parallel border composed of small curves rhythmically repeated.

NOTE.—It is well worth while always to make detailed notes *at the time*, when experimenting as to lengths and as to the processes or stages through which the bending of the links or units has to pass. For such notes, a very handy way of making a rough but sufficiently accurate illustration of a chain link or other unit is to put the unit underneath the page of your notebook on which you want it to appear, then to hold the paper down so that it is stretched tightly over the unit, and rub that part of the paper with the flat side of a " heel-ball," which you can get from any shoemaker or leather-seller. An impression of the unit will then appear in black upon the paper. A lead pencil will do it too.

Illustrate your notebook with these rubbings, to show each part or stage of the bending as it is completed, and write down information as to the pliers used for that stage. It is difficult to remember, after an interval of time, the exact methods by which particular shapes were got, and when it is a question of using wires of various lengths for chain links, if at the time when these were first made the length necessary for each different link has always been written down, then, when you want to repeat them some other time, you will be saved the time and trouble you would otherwise have to spend in making fresh experiments. It is also a very good plan to keep a complete set of samples of partly-made links, making each sample represent one stage in the bending process. These should all be fixed securely on to a card or board * in the order in which the bending processes follow one another. The first sample in each of these sets should be a straight piece of wire of the exact length which is required to make that link.

In making these and similar chains, there can be no hard and fast rule as to keeping to one fixed length of wire for *all* the links.

They form an exception to that safe general rule for unit jewellery.

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* See also the jewellers' cement method which is described on p. 149.

CHAPTER XXVII

AN ALPHABET FOR JEWELLERS

YOU will now be able to decide with confidence on the length of wire to adopt for your units. Do not make the decision in a hurry, but when once you *have* made it, stick to the length chosen; at all events, until you have given it a reasonably full trial. Except in the case of chains, it is not likely that satisfactory designs would result from mixing up units derived from several different lengths of wire, when the character of the units was at all similar, more especially if the differences between one length and another were slight. And if you allow yourself to have units lying about which have been made from wires of slightly varying lengths, it is sure to be a troublesome job to distinguish which among them belong to any one set.

It is quite possible that you may have found some of the trial units, especially, perhaps, the two last, difficult to make, but do not be discouraged by that—they *are* difficult, but there are lots of other forms which, while they are perfectly easy to make, will, nevertheless, produce an infinite variety of good patterns. When you have had plenty of practice with easy ones you will get on better with those which are difficult, for there are many little things to learn in the handling of pliers, and only practice will teach them. A few difficult forms had to come before their proper time for the reasons already given.

Whatever length of wire it may be that you have decided to use out of which to make your units, it will be assumed that you have accumulated a really good, generous supply, so as to minimise the annoyance of being brought to a stop for want of more pieces, perhaps just when you are in the middle of an interesting series of experiments, with several half-formed ideas in your mind, all of which you want to develop immediately for fear of forgetting them.

Do not forget about "squaring the ends" of your wires in the way that was described and illustrated on p. 91. When they are all sealed together, it is easy to test the accuracy of their length and to make sure that the wires near the middle of the bundle are no longer than those which come outside.

And so at last we are ready to set to work in earnest at making, and let us hope, also, at *discovering*, units.

If you can possibly spare the time to make what may be called an alphabet or sampler of units of your own on the lines of Figs. 14 to 14D, and if you have enough patience to carry the idea through with some degree of completeness, it is not likely that you will ever regret the time and energy expended.

As has already been said, the variations illustrated in this book are very far from exhausting the possibilities of what can be done, and the search after new forms is really extraordinarily interesting to any one with an inventive turn of mind. I remember very well, when the idea first occurred to me, that—before trying with pliers and wire—I began by jotting down on a scrap of paper such forms as came into my head, which, of course, was an entirely wrong method, as became evident after a while, and all I could think of then in that first effort came only to about twenty. That seems incredible, no doubt, but it must be remembered (1) that it was quite natural to begin by thinking only of forms which were fundamentally different one from another, and (2) that such a search, unstimulated by the simultaneous handling of either the material itself or of the tools proper for shaping it, was likely to be barren, especially in the case of a mind which is much more fertile on the practical than on the theoretical side.

After a while, however, when I had got seriously to work with pliers and wire, I succeeded in finding 100 variations, and these were then photographed (Fig. 63). I was rather well pleased with this beginning of an alphabet, so much so, indeed, that I remember thinking at the time that those six rows of units must include pretty nearly all the practicable ones.

That belief shows plainly, in the light of after experience, how little I had then realised of the wealth of suggestions lying in the action of the pliers, although, no doubt, a good many of the forms in Fig. 63 were the direct result of watching the process of formation of other units which had themselves been thought of without actual reference to the tools to be used.

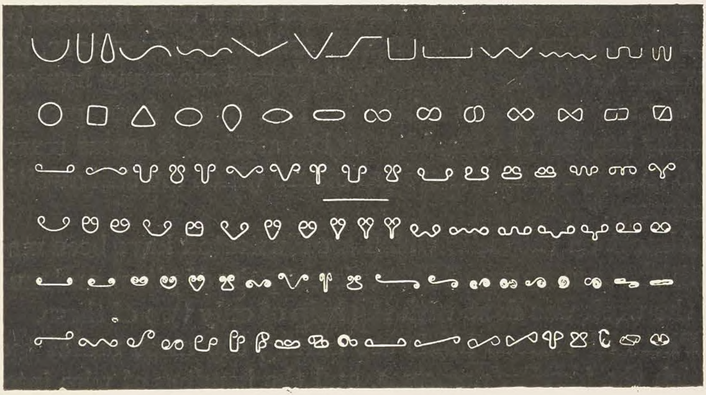

FIG. 63.—My first hundred units.

Still, that little collection of a hundred units was probably arrived at much more by "thinking" than by "handling." Neither of those two methods is of much use without the co-operation of the other one, and different workers will, no doubt, vary in attaching greater importance to the one or to the other. My own experience makes me think that, when I am about to try some new method of *handling*, no matter how it may have been suggested to my mind, I generally have only a rather hazy notion of what the resulting form is going to look like ; and even if that notion proves to have been fairly correct so far as it goes, it is not an unusual experience to find that the really important aspect of the experiment lies in some slight and unforeseen modification of contour or else of the *space* which the outline of the form encloses, and this is only revealed by the handling, provided that the thinking apparatus is looking out for it, or for something of the kind.

However that may be, I know that, after an interval of some days, on returning to the quest for more units, fresh avenues of development gradually appeared ; and seeing that 100 units gradually multiplied until they became 700, and then, later on, a thousand, and seeing, moreover, that a reader of " Simple Jewellery " showed me many hundreds of further variations which he had made from precisely similar lengths of wire, identical in section, it seems reasonable to suppose that there are others which are still awaiting discovery.*

Almost all the units which are illustrated have been made with one or more out of five different pairs of pliers, and much of the work was done with the help of only two of these.

Pliers of various kinds are among the most useful tools which the jeweller possesses, and the bending of wire into a great number of different shapes affords an excellent way of learning how to handle them ; of learning, also, how much it is possible to do with them, and how much useful knowledge of the first elements of design may be thereby acquired.

When an attempt is being made to discover the utmost variety of different forms which it is possible to induce bits of wire of a given length to assume just by bending only, it is an important point to notice that most of the possible shapes are actually suggested to the mind while the hands are engaged in experimenting with the various different kinds of pliers in their action upon the wire.

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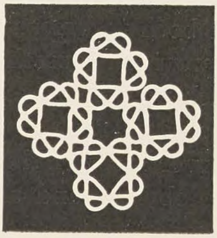
* It is since these words were written that many of the small ornaments were made, with one of which each chapter opens, and it is interesting to note that some of the units which have been most productive in these patterns are new ones which do not appear elsewhere in this book.

Thus it is well to observe attentively the effect of the manipulation of the wire at every stage with a mind that is all alert to seize instantly upon every slightest modification of treatment which may be suggested, and it is also well to experiment, then and there, in the development of any such idea while it is still fresh and active in the mind.



CHAPTER XXVIII

AN INEXHAUSTIBLE MINE

To bend a piece of wire into a definite shape by means of pliers is not always as easy as it looks.

Generally, while there is one right way of doing it, there are also several wrong ways; and by the time you have followed out all the variations that occur to you—not laboriously copying forms that other people have made, but patiently finding them out for yourself—you should not only have acquired a considerable amount of general knowledge that will be useful to you both technically and artistically, but you should also have provided yourself with an unfathomable mine of ideas, to which you can at any moment refer when you want to produce a new design.

To the casual observer most of these little pothooks and other forms are quite obvious and uninteresting, and they are, perhaps, more suggestive of an alphabet of shorthand or of a sample card of haberdashery than of anything else, but there are very few of them, if, indeed, any at all, which cannot be made to become the germ of a beautiful pattern. Several of the units in Figs. 14 to 14D will be recognised at once by any one familiar with ancient jewellery as being very old favourites which have done valiant service as motifs of designs for thousands of years.

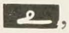
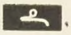
But the surprising thing is that, where such forms as these occur, so very few varieties have hitherto been used and so little advantage has been taken of their readiness to compose themselves into patterns almost without effort on the part of the designer.

The same few forms recur again and again, and they are much more often used just as a filling for backgrounds than as units out of which to build up constructional designs. Looking at them from this latter point of view, many variations which, when taken singly, appear too incomplete to be worth consideration, may yet, if repeated and used in conjunction with other forms, prove to be, not only admissible, but even to be of the greatest value as material for pattern building.

Next, then, it will be best to take the small round-nosed pliers (Fig. 19, N, p. 45) and to curl the ends of some of the wires, and to bend them into all the forms you can think of, making regular stages in the bending, so that the results vary in evenly-graduated sequences, the pliers being turned each time through, say, 90 degrees, *i.e.*, through one right angle, that amount being easily gauged by the eye. In some cases, no doubt, the difference may seem too slight to be regarded as a fresh form ; but in others half that variation, or even less, will be found to be well worth recording. Generally speaking, the degrees of variation should be smallest when the form is mainly composed of straight lines. Only do not let yourself be bound by rules in these matters. Use your own judgment, *but*—always prove to *yourself* by experiment that it is correct. Thus, when you feel uncertain whether a variation is worth recording, make three or four duplicates and place them one against another in different ways, and you will generally be able to see whether the form in question is a useful one or not. Many variations which, when taken singly, appear too incomplete to be worth consideration, may yet, if repeated and used in conjunction with other forms, prove to be, not only admissible, but even of the greatest value as material for pattern building.

When you have made all the forms which the round-nosed pliers will give and have exhausted, for the time being, any suggestions of ideas which may have been aroused in your mind by the action of the pliers or of the wire, it will be time to begin using pliers of another shape, and it will be best to take the snipe-nosed ones next (Fig. 19, K, p. 45). If you have two pairs of these, take the larger pair with the blunt ends.

You will now be able to make a very large number of different units with the two pairs of pliers so far used, and you will do well to restrict yourself to these two pairs alone until you find yourself unable to obtain any more variations with them. If, while engaged upon these exercises, you scrupulously avoid any reference to illustrations of units so made, and rely on your own invention and the experience gained from trying experiments with the pliers, the benefit derived will be very much greater than if you laboriously imitate the forms shown in Figs. 14 to 14D, or in other plates in which such units occur. At the same time, you will also find the exercises less tedious and very much more interesting if you invent them for yourself as you go on, than if you merely copy. The units should be arranged in sets in an orderly way as fast as they are made, and whenever a new form, suggesting a fresh series of variations, is accidentally produced or incidentally thought of during the progress of making another set, it should be put aside by itself, as a reminder that it requires development later on.

While working out one set, it may occur to you that, by treating only one end of the wire and by leaving the other end straight, like , or by using one of the many forms into which it can be bent, such, for example, as , instead of treating both ends alike, a whole series of other sets becomes possible. It is in such a case as the one here suggested that it is so great a help to make memoranda for future use, and to make them at once, before there has been time to forget the idea. One method of doing this has already been mentioned, but the subject will be fully dealt with in the next chapter.

After a while the want will probably be felt of the pointed pair of snipe-nosed pliers (Fig. 19, K, p. 45), in order to give shorter and sharper bends than the others will produce, and equally so when the need occurs to grip the wires quite close to the scrolls or loops which have been made with the round-nosed pliers.

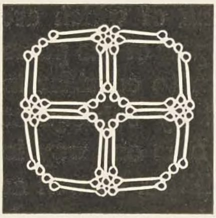
The larger size of round-nosed pliers (Fig. 19, F) and pliers with broad, flat ends (Fig. 19, G) will also facilitate the growth of further variations. The latter kind are especially useful in making units such as those illustrated in Figs. 14B and C, as well as for various other types, such as many of those in Fig. 14D.

It is a good plan to satisfy yourself by experiment that you have made all the units you can think of which are capable of being formed entirely by any one pair of the pliers which you have at your disposal, and then to consider in what various ways they can be modified by subsequent treatment with any of your other pliers. It is one way in which to guard against overlooking possibilities, as well as being an admirable method of learning how to use your tools to the best advantage.

It is often difficult to foresee what will be the result of the next stage of bending, or what other treatments may be suggested thereby; and, furthermore, it is not always the simple forms which occur to one first, and it is good training for the faculty of invention to carry an exercise of this kind as far as one is able to do.

CHAPTER XXIX

ARRANGING UNITS IN SETS



A reference to Fig. 14 will explain what is meant by arranging the units in "sets." Thus, taking the topmost unit and the twelve others immediately below it, we see that these thirteen units make one complete "set" or family, except that the straight length of wire from which these and all the other units in Figs. 14 to 14D are derived does not appear. But the word "complete" is, perhaps, misleading, because several intermediate variations could have been added while still leaving a perceptible difference between one variation and the next.

If, however, a large number of repetitions of any one unit have to be made, all of them as nearly identical as may be, then it is much easier to do this if the angle through which the pliers must be turned while gripping the wire is one that can be gauged pretty exactly by eye and by "feel," without stopping frequently to make actual measurements.

For that reason the gradations between the variations in these and other similar examples have been kept fairly obvious. Still it may easily happen, when you are arranging a design, that the need for a more subtle gradation may become apparent, and if so, then that is the right moment at which to supply such a need.

From time to time one of the units should be repeated, until a little stock of duplicates has been accumulated out of which to build up arrangements and patterns. This will provide a pleasant interlude of relaxation when the pattern-building stage is reached, and the interest and amusement of that process should supply a fresh incentive to the elaboration of other units.

In order to keep the units temporarily in sets and groups so as to be convenient for easy reference, and similarly to make quick temporary notes of any arrangements or patterns, when such are made, there is nothing better than soft modelling *wax* (not plasticine) spread out thinly as described on pp. 95, 96, because these arrangements are nearly sure to involve changes from time to time, and so long as they are only mounted on modelling wax, changes of arrangement can be made rapidly and easily.

When the sampler is as complete as you propose to make it, you will probably want to set out your units in a more systematic and orderly fashion than it will have been possible for you to do at first. When that time comes, moreover, it will be convenient to have the modelling wax available for making temporary records of other designs upon, and the units which form your sampler can be mounted finally in a more lasting way, such as by means of a thin coating of jewellers' cement, spread by heat over a piece of sheet metal. After this has cooled and set hard, the units can be arranged in the desired positions, and when all is ready, the metal is again heated until the cement melts and attaches itself to all the units.

The units illustrated in Figs. 14 to 14D were fixed in a similar way on sheets of glass, only the glass had previously been covered with a thin layer of Canada balsam, on account of its transparency and great tenacity.

The balsam was allowed to flow over the surface of the glass, gradually, under the gentle action of hot air. For this purpose the glass was supported on two metal rods laid across the open top of a big, square biscuit tin, beneath which an ordinary gas ring was kept burning, with an asbestos safety boiling mat between the gas ring and the tin box.

When the whole surface of the glass was entirely covered with balsam, it was held slantwise until all excess of balsam had been allowed to run off back into the bottle from one corner of the glass sheet, and then the latter was replaced over the hot air for a minute or so in order to obtain a perfectly even, flat surface, after which it was allowed to cool on a *truly level* surface. The next stage was to place the glass on a sheet of paper on which a number of concentric circles and radial lines had previously been drawn in ink, and now, the balsam being quite hard, smooth and transparent, it was a comparatively easy matter to arrange the units in an orderly fashion with the help of the lines which had been drawn on the paper.

When all was ready, the glass was very carefully replaced on the top of the biscuit box until the warm air had again melted the balsam, thereby allowing the units to settle down on to the glass, where they still remain after a lapse of ten years.

To obtain satisfactory photographs of these samplers of units set in balsam was not so easy.

Capillary attraction had caused the balsam to rise against the side of each unit, forming what engineers call a " radius." That is to say, the surface of the balsam, though, generally speaking, flat, had risen in a slight curve wherever it came into contact with the wire of the units.

As its surface was perfectly smooth and shiny, this caused such a complication of bright reflected lights as to baffle the photographer completely. After many experiments, the photographs from which Figs. 14 to 14D resulted were obtained by painting over every scrap of the balsam background with rouge and water, which photographs nearly black. But it was a long job.

From the point of view simply of making a permanent record, the jewellers' cement on sheet metal method is much less troublesome, and quite satisfactory, but if for any reason such as that given above you want to arrange your units on a transparent surface with guide lines visible through it, then Canada balsam will be what you need.

CHAPTER XXX

RECORDING IDEAS FOR FUTURE USE

The jewellers' wax and Canada balsam methods of keeping a number of units in certain relative positions, whether temporarily or permanently, are neither of them altogether suitable for making a memorandum of a pattern which is composed of units out of which you are perhaps in the act of making some other experimental arrangement, of which the pattern you wish to record is a variation or only a portion.

In such cases, where the units will be required for use again quite soon after the memorandum has been made, there are various alternative methods. If you are using modelling wax, then it is true that, as was explained on p. 96, after the units have all been pressed into the wax, they can be carefully removed, one by one, with the tweezers, leaving the design impressed in the surface of the wax. This can be put away for future reference, but in that case no further use can be made of that piece of wax without destroying the record. If this is an objection, a cast can be taken with plaster of Paris, mixed rather thin, so that it may run into all the impressions, but that is a messy job. If the wax has been spread thin enough, so that, when the wire units are pressed down into contact with the tinned sheet, their upper edges remain clear above the wax surface, a black carbon print can be taken on white paper by simple pressure. To do this, first spread over the pattern a thin sheet of very slightly greased tracing paper, with the greased side towards the wax. Then lay a piece of carbon paper on that, *with the black side up*, then a sheet of clean white paper to take the print, and over that several thicknesses of blotting or other soft paper, and, finally, a piece of stout cardboard. If these are all squeezed together in a copying press, a good print of the design will be obtained (see Fig. 64), but it is difficult to spread the wax out thin enough, and unless there is something of this nature to keep the units from moving about, the pattern would be sure to get disarranged when the layers of paper were put over it or while it was being transferred to the copying press.

In order to obviate this difficulty, the units may be arranged on any smooth, flat surface, and may then be kept temporarily in position by carefully laying down upon them a piece of cardboard or stiff paper whose under surface is wet with strong paste or gum. Seccotine spread very thinly with a palette knife answers admirably. In a few minutes the cardboard may be lifted up with all the units sticking to it in the exact positions in which they were arranged, if the cardboard has been well pressed down upon them.

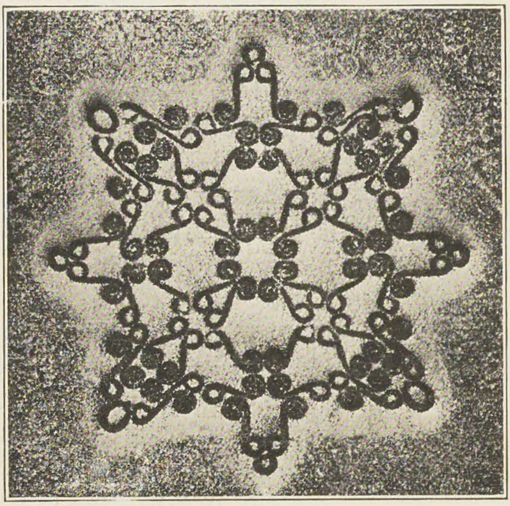


FIG. 64.—Record, made with black carbon paper, of an arrangement of *loose* units.

When the mucilage is perfectly dry, a carbon print can be taken, as before, and there will be no necessity for using tracing paper now, so that a sharper impression will be obtained.

Fig. 64 shows a carbon print which was taken by that method with the help of an ordinary office copying press. A close examination of this illustration will show that there is a very fair suggestion of the close scroll into which one end of each of the wire units had been curled. It is also quite possible to get a tolerable carbon-print record by simple pressure with a small hand roller, but this is more difficult.

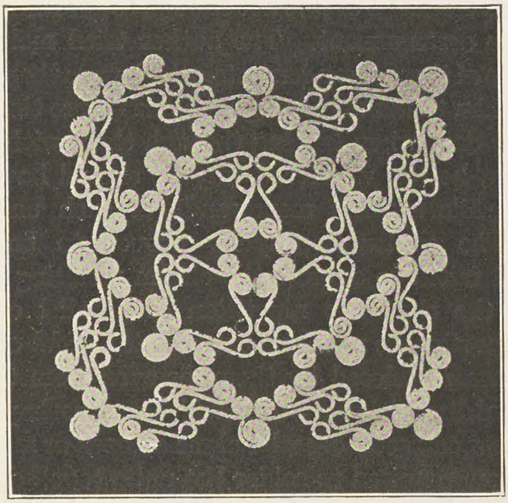


FIG. 65.—Ink-spray record of an arrangement of *loose* units.

Another way of obtaining a record is to arrange the units in position on a piece of white paper, and then to direct a spray of ink over them until the paper is shaded over with minute specks. When the units are removed, the design appears on the paper in white (Fig. 65), and the spray should be so fine that it actually gets through between the turns of the scrolls in places. The simplest way of producing the spray is with an old toothbrush and the butt end of a penholder, a little ink being taken up in the brush and rubbed across the penholder stick over the paper, and for this ordinary writing ink will do. It is, however, rather a messy job, and, of course, the units must be washed and dried after being sprayed. But, on the other hand, it is quick, effective and permanent.

It might very naturally be suggested that the simplest way of recording patterns is to draw them, but the fact is that it is really very difficult to express quickly with pencil and paper the charm of designs built up out of the frequent repetition of one or more wire units of, perhaps, rather complicated form. For it is not enough to give only the main lines of the arrangement. The author tried making rough pencil notes of these arrangements, which were then put aside, to remind him to make them up at some future time. Then, some other day, when looking through them with a view to using them, he has wondered why he should have thought it worth while making memoranda of such uninteresting designs. The explanation really proved to be that the sketch had failed to express the charm resulting from such things as the rhythmic repetition of parallel curves, the actual proportionate relations between the *width* of the wires and the *spaces* enclosed by them, or even from the regular symmetrical disposition of a form which was, perhaps, not very easy to draw correctly *once*, let alone a dozen or more times.*

If the time required to solder the units together then and there cannot be spared, then perhaps the best method of recording the patterns is to keep the units in the position in which they are arranged. If the units for these trial patterns are made of brass or copper wire, the value of the material is insignificant, and by making the arrangement on some smooth, flat, clear surface, the design can be preserved well enough by coating the surface of a bit of cardboard with strong paste or seccotine, as already described, and then putting this surface down on to the units and leaving it there under a weight until dry. If the units are not otherwise required, they remain gummed to the cardboard as a lasting record of the design.

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* When the arrangement only includes a few units, then the method which was described in the note on p. 137 is useful.

If, instead of pasting the cardboard, it is made thoroughly damp and soft by exposure to steam or by soaking it in boiling water, and if it is then left on the units under a heavy weight for some time, a clear mould of the pattern will be impressed permanently in the surface of the cardboard (Fig. 66). But the cardboard must be of rather a soft kind, and the weight must be very considerable. A simple press made of two smooth pieces of fairly hard wood drawn together by a sufficient number of strong screws round the edges does very well. Fig. 67 shows a record made by squeezing the loose units into soaked cartridge paper in a copying press.

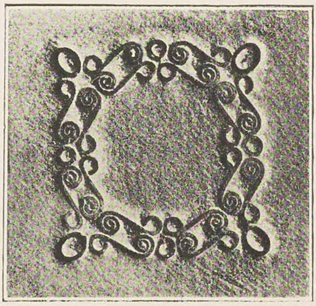


Fig. 66.—Record of an arrangement of *loose* units, impressed into wet cardboard under weights.

It would naturally seem as if the simplest plan would be to solder each arrangement of units as soon as it was designed, but in practice one finds that this is hardly workable. Each arrangement that is made has a delightful way of suggesting, during the actual progress of the work, variations of itself, or sometimes quite different arrangements. The units that compose the design will generally have to be soldered together into several groups or clusters first, just as was the case with the ornaments made from clusters of grains; and when these preliminary groups are ready, it will often become apparent that the design in hand is only one out of many different compositions which these same groups will give by being turned about and associated otherwise. The author's experience is that it does not do to rely entirely on the memory to preserve all the fleeting ideas that follow one another so rapidly at these times, nor even, as he has already explained, can we rely on pencil memoranda, while soldering is much too slow. So it is best to have an ample reserve ready of whatever units are being employed and to make notes with these of every idea at the actual moment when each one occurs, with the least possible interruption of the work in hand, so that nothing may be lost. "Gather ye rosebuds while ye may."

The permanent record of all these variations need not necessarily be made then and there. If the bench gets littered with memoranda in loose units awaiting attention so that there is a danger of their being disturbed before there is time to transfer them to permanency, they may be covered over with pieces of cardboard which are secured with drawing pins to the bench, and in that way the arrangements are kept safely enough for a time; or a piece of glass with a thin slice of cork gummed under each corner answers the same purpose, and so it is possible to finish the work in hand with the minimum of disturbance, and the next day, perhaps, it may be easier to spare an hour or so for giving the memoranda that have been made some degree of permanence, by whatever method we may find most convenient.

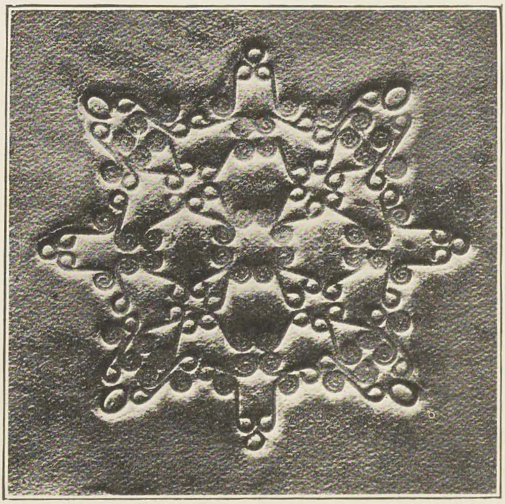


Fig. 67.—Record of an arrangement of *loose* units, impressed into wet cartridge paper in a press.

When you want an accurate record on paper of any single unit or of an arrangement of units, all of which have already been soldered together, then direct printing on sensitised photographic paper will give admirable results.

The line blocks for printing the ornaments at the beginnings of the chapters, as well as those for the separate units which come so often in the text of this book, were nearly all of them made in this way, as also the tail pieces.

Before leaving this subject of making records of designs and ideas, it may be well to tabulate the various methods which have been suggested above, with references to the pages on which each method is described.

To make Records.

(*a*) By means of impressions in—		
(i.) Modelling wax . . .	*See pp.*	95, 96
(ii.) Plaster of Paris . . .	,,	151
(iii.) Cardboard or paper . .	,,	155
or (*b*) By prints made with—		
(i.) Carbon paper . . .	,,	151, 152, 153
(ii.) Ink spray	,,	153, 154
(iii.) Heelball or lead pencil . .	,,	137
(iv.) Photography . . .	,,	156, 157
or (*c*) By fixing the units themselves—		
(i.) In modelling wax on a backing of metal or card . .	,,	149
(ii.) In jewellers' cement on metal	,,	149
(iii.) On card, wood, glass, metal, etc., by means of an adhesive medium, such as seccotine or Higgins' vegetable glue or Canada balsam .	,,	149, 150, 154

CHAPTER XXXI

THE EVOLUTION OF DESIGN FROM UNITS

In order to demonstrate how the readiness of these units to form themselves into patterns may be turned to good account, let us select one of the simpler shapes ; say, for example, the unit , which comes third from the top in the middle group of Fig. 14B.

Let us now make a considerable number exactly like it, and let us then arrange them in clusters or groups of two and three and four in every variety of relative position that we can think of (Fig. 68).

The soldering together of groups of units is done in the same way as was described for groups of circular forms (Chapters XII. and XIII.). When the joints have been soldered and afterwards " boiled out " clean, the cluster of units will probably need setting flat, letting it lie on the steel stake and giving it a few light taps of the hammer. If any of the joints are faulty, this hammering will probably cause them to open, and if it does, they must be neatly closed and re-soldered *before* proceeding further.

It may perhaps be said that Fig. 68 does not carry us very much nearer to interesting designs ; but if we now take a number of repetitions of one of these clusters and again group those repetitions together, it will be seen from Fig. 69 that our little unit is now beginning to show us something of what it can do in the way of pattern designing quite by itself, if given a chance.

But the truth is that it is not really quite by itself, for one of the essential characteristics of these patterns is that we always have, not only the units themselves, but also the space enclosed by that particular arrangement of the three units, and it is the rhythmic repetition of these units and spaces contrasting which makes the designs interesting. Besides which, spaces of other shapes and proportions are automatically produced and repeated, again rhythmically, as a necessary and very delightful consequence of the systematic grouping of the clusters.

The design whose growth is traced through a series of stages in its development in Fig. 70 will be recognised as one of those which is shown also in Fig. 69, and Fig. 71 shows one of many ways in which such a pattern may form the basis or skeleton of a comparatively elaborate ornament.

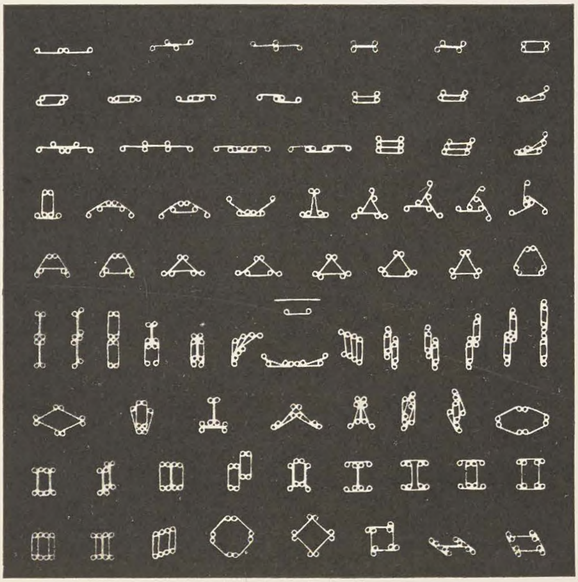
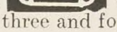


Fig. 68.—Repetitions of  arranged in clusters of two, three and four.

It would be out of place to enter just now into a description of how the various processes which are necessary to this elaboration and completion are performed, but they are dealt with in their proper places later on.

Also, there is a detailed criticism of this ornament in the chapter on "Learning by making Mistakes."

It should be noted at this point :—

(i.) That the series of designs developed from a chosen arrangement, as illustrated in Fig. 69, resulted entirely from moving the units about and disposing them in groups, not from copying designs drawn on paper " out of one's head."

(ii.) That a considerable amount of variety and of interest is obtained without using any other element of design whatever (except space). How much more, then, might there not be if we selected from all the other elements of design accessible to the jeweller those which are most suitable to enrich, clothe, and contrast with the forms and lines already obtained ?

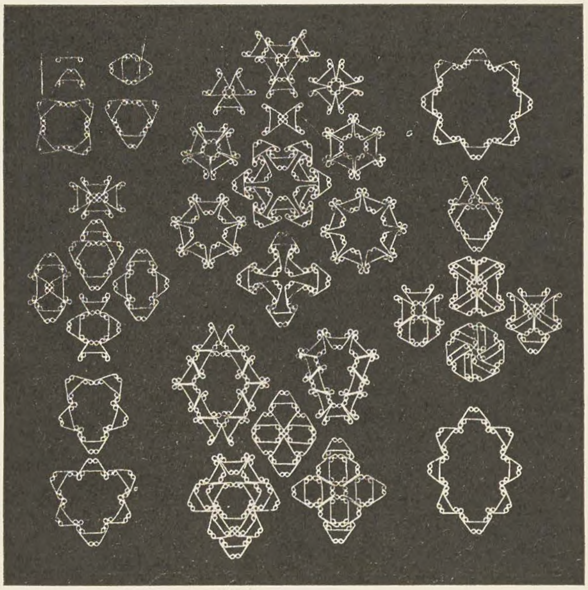
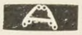


Fig. 69.—Designs made by grouping repetitions of  .

(iii.) That every one of those patterns is composed solely of that particular arrangement of three repetitions of the one unit chosen, and that, if some of the other arrangements were introduced as well, and if, moreover, the same unit was also used singly, the effect of these patterns would be materially

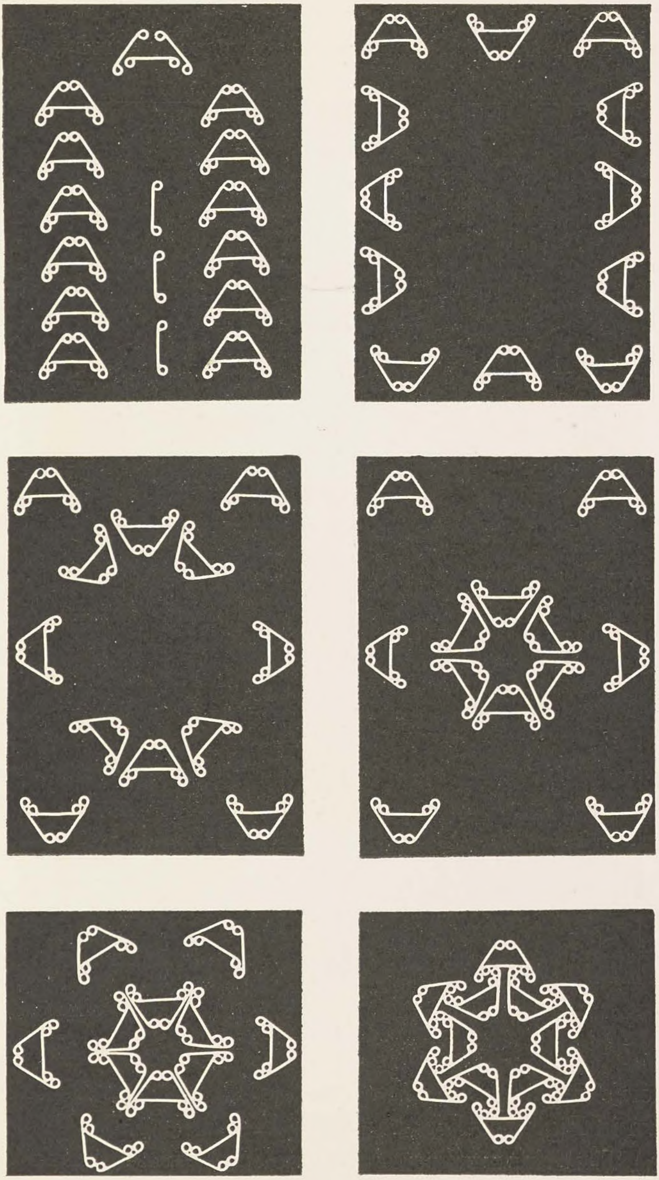


FIG. 70.—Stages in the growth of a pattern.

altered—perhaps improved, perhaps not—but certainly altered.

(iv.) That similar, though in each case different, sets of

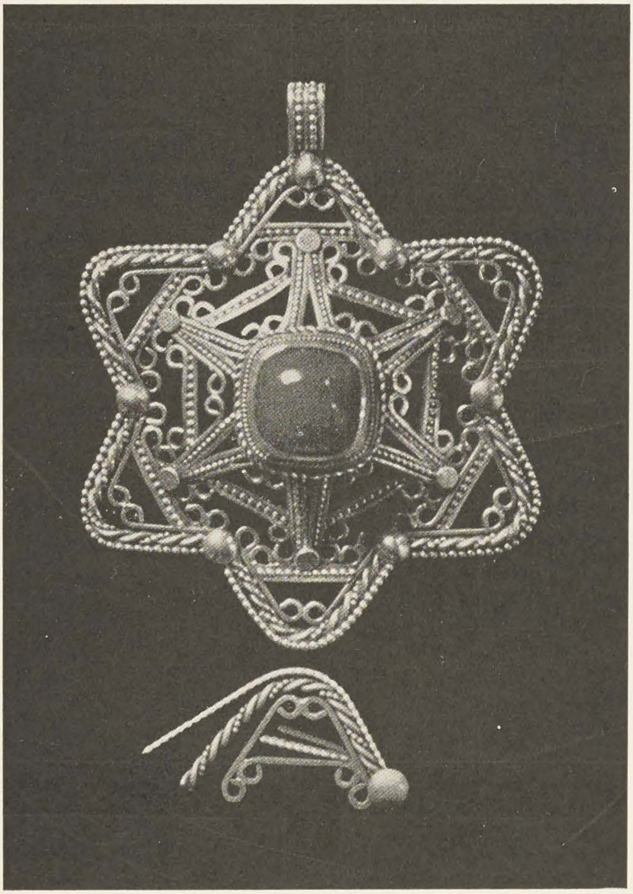
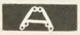
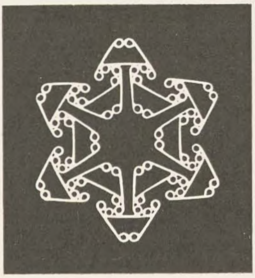


Fig. 71.—One way of using the completed skeleton pattern from Fig. 70.

patterns might be built up out of repetitions of clusters shown in Fig. 68 other than .

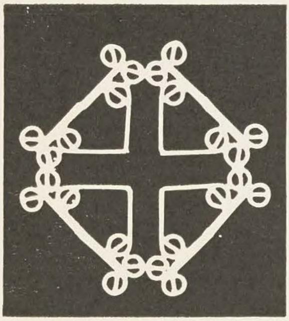
(v.) That this method of using nothing at all but repetitions of a small group, such as the one selected, ensures the preservation of a strong sense of unity in the resulting patterns comparable with that obtained by a painter when he limits himself to two or three colours. And

(vi.) A very important point. While it certainly imposes rigid limitations, it does actually suggest arrangements which it is unlikely that the designer would think of if he was dealing with the unit singly, instead of always in that particular *grouping*; or if he was relying upon his imagination, assisted only by pencil and paper, instead of by the visible results of experiments made with the help of units in tangible form.

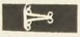


CHAPTER XXXII

INEVITABLENESS IN DESIGN



This method of design by repetition of certain groups also has a way of giving results about which there will sometimes be a rather pleasant sense of inevitableness. It comes as a consequence of the exact repetition of a selected arrangement or cluster composed of two or more units—probably all of them identical in form—and as the relative positions of the units are always just the same, it follows that these units must always recur in that particular mutual relationship one to another. That is not to say that they will not recur in another and perhaps a very different relationship also. In fact, they most certainly *will* do so, unless the units are of such a nature that they may be said to have neither back nor front, so that they look just the same from whichever side they may be seen.

One consequence of the group of units recurring over and over again, always in the same mutual relationship, is that the groups will always have to be repeated a certain precise number of times if ultimately they are all to " fit " together—exactly—on any particular plan. Fig. 72 is a good example of that theorem, because obviously it may quite properly be regarded as an association of nine repetitions of , and it is clear that neither more nor less than nine repetitions of that particular cluster could possibly fit together to form a complete wreath with all of the clusters in nice contact with each other at all the four " corners " of each cluster ; and so, when an arrangement of this kind does happen to be possible, it naturally must have something of that peculiar and generally attractive quality of inevitableness.

Moreover, when a series of repetitions of a selected cluster of units *will* crystallise into a perfectly completed figure like that, we see, not only in this particular example, but in several others where the same or a comparable kind of crystallisation has taken place, that the form of the individual cluster or unit eventually retires from notice, because, at the moment when crystallisation happens, each individual part is instantly merged in the general effect of the whole design. There are other examples of this little phenomenon in Figs. 69 and 73.

It is probably quite true that, when we happen upon a design in the arrangement of which all the parts *just* fit into their relative positions, with no gaps left unfilled and nothing left to the arbitrary decision of the designer, this design will almost of necessity have some degree of obviousness in its character, and perhaps it is equally true that "the obvious" in composition is generally a thing of which it is necessary for the discerning designer to beware. Well, that is one of the many points on which no hard and fast rules will hold. But do not forget that there is obviousness in many pleasant natural forms, and when you light upon a design about which you have a suspicion that there is too much of that character in it, just consider whether, on closer inspection, you cannot also perceive some secondary combination of lines or forms or, which is perhaps the most likely of all, of *spaces* which is not so very obvious. In a word, ask yourself if the design, in spite of its obviousness, is, nevertheless, *interesting*. If you think it *is*, then preserve and develop it thankfully. But if, however carefully you may examine it, you can find nothing at all subtle, nothing "below the surface"; if, in fact, you feel obliged to admit that it is just *dull*—then cut it out!

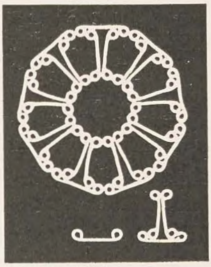


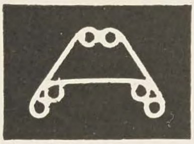
FIG. 72.—Arrangement of units forming the basis of the pendant in Fig. 4.

When you are going to make a small cluster out of two or three repetitions of a single unit in such a way that a great variety of designs may result after numerous repetitions of that cluster are arranged together in larger groups (as in Fig. 69), there are several points of view which it may be worth while considering.

(1) Let the selected unit contain an appreciable amount of straight line in its composition.

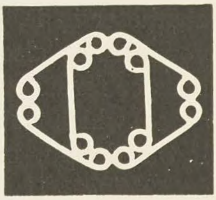
(2) Do not select any unit which is more or less a complete design in itself, such, for example, as a figure-of-eight unit. A cluster formed by associating together two or three such units would almost certainly produce dull, monotonous designs when repeated many times.

(3) In grouping repetitions of the selected unit together to form a cluster it is well to avoid anything like a regular rectangular form and to take care that the sides of the cluster are not all alike.



This figure is, roughly speaking, triangular in form. Two of its sides are alike, and the third side is very different from the two others. This cluster rather suggests the form of a capital A, and the open space beneath the " bar " is a particularly valuable characteristic from the point of view of producing many variations of design by arrangement.

Also, it is easy to see that this space, if it is repeated in the reversed position, will have a pleasantly varied outline.



If the sides and angles of the cluster had all of them been identical, it might have been difficult to have derived interesting designs from . But, on the other hand, the patterns on pp. xxxiv. and 23 show that sometimes these conditions do *not* form an obstacle to making *a few* pleasant designs.

Experimental trials of the effects to be obtained by the repetition of any given group of units, such as those in Fig. 68, may also quite usefully be made in the following way.

First solder together the units which are required to form the arrangement whose utility for design you wish to test, and then solder * the group on to a scrap of thin sheet metal just big enough for it to lie on and trim off any sheet that may project outside of the units.

Punch a small hole through the sheet wherever it covers a space enclosed by the wires of the units, and then solder a piece of fairly stout wire so that it stands up from the middle of the sheet-metal backing to form a handle. You can then use this as a stamp, either to make impressions on a waxed sheet or to print with on paper, and so repeat the design in any arrangement you like experimentally. The holes are to let air in when drawing the stamp away from an impression made on a waxed surface, as this makes the wax less likely to stick to the stamp. For printing on paper,

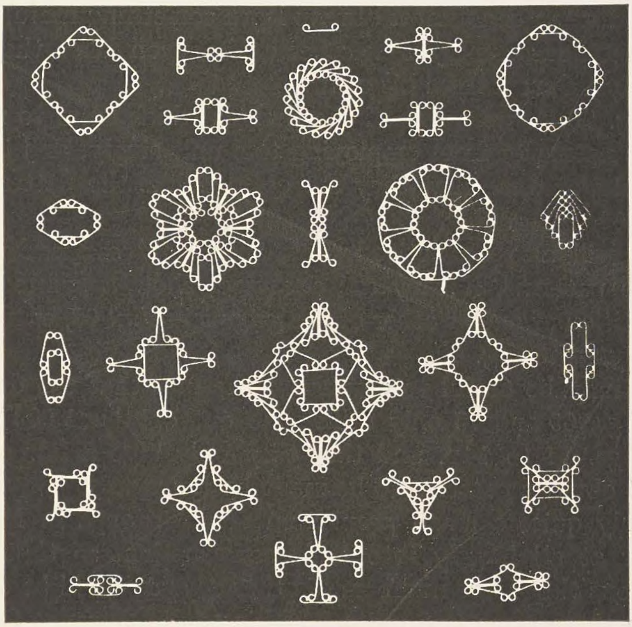
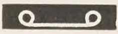


Fig. 73.—Designs made by grouping repetitions of .

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* A good alternative method is to secure the units to the backing of sheet metal by means of jewellers' cement.

an ink pad may be used or the face of the stamp may be blackened in a smoky flame following the method used by bookbinders when they make designs of ornamentation with the tools themselves.

It seems possible that, while the jeweller takes a hint from the bookbinder, the process may also work the other way round, too, and that a bookbinder wanting new designs for his punches might find them by bending units out of wire. A craftsman can almost always learn something useful from the methods employed in other crafts, even when they are widely different from his own.

Fig. 73 shows a few of the designs which seem to result most naturally from employing this unit singly, and it will be seen at once that they are quite unlike the patterns in Fig. 69.

It will also be noticed that, with only one exception, these patterns, if they are analysed, show a symmetrical repetition of one or other of the groups in Fig. 68, excluding that used in Fig. 69.

It may be useful to emphasise the fact that the designs in Figs. 69 and 73 only utilise *one* out of the 1,000 units in Figs. 14 to 14D, and that they only give a few of the most obvious patterns to be made by its use.

Only quite a small proportion of the groups in Fig. 68 enter at all largely into their construction, so that it is obvious that large numbers of other designs could be drawn from these same two units. Making full allowance for the probability that many of the other units in Figs. 14 to 14D would be less prolific, but remembering how much variety results from first composing a small group and then repeating it, as in Fig. 69, it is hardly to be denied that the permutations and combinations to be derived from the remainder offer a truly inexhaustible source for designs of this kind.

CHAPTER XXXIII

VARIOUS KINDS OF CHAIN

IN order to make a reasonable number of experiments with a few of these or similar units it must be obvious that a very great many of them have got to be made, and that a considerable amount of rather monotonous toil must be faced in doing this.

But it is comparatively easy to bear with the tedium of repeating the same thing a large number of times when you are buoyed up by the exciting anticipation of how you are going, presently, to use these tiresome little units in playing, in however small a way, at the great and glorious and altogether absorbing game of discovery, or invention, or composition—call it what you will—in which these units, so dull in themselves, are going to be endowed with vigorous life ; are going to dance together in all sorts of intricate measures and figures ; are going, finally, to crystallise of a sudden into undreamed-of patterns, and to lead you goodness knows how far away from the original starting point.

Moreover, the making of these units is such a convenient little job to fill up spare moments with at times when it is pleasant to have your fingers occupied. A supply of plain lengths of wire and a pair of pliers in your pocket, and you can turn to at any time and get a little stock of units ready for subsequent use ; in your armchair by the fireside, or on a long journey, or during a wet holiday, or even in bed, if you are recovering from an illness.

There is, however, in the jeweller's craft another branch of tedious work which does not seem to have any corresponding alleviation, for the process of chain-making can hold out no such alluring reward to those who toil at making and joining together endless numbers of links.

No doubt it may fairly be said that far too much is used of the ordinary chains, in which every link is just a tiny circle or oval, exactly like its neighbours, and that in many cases a less mechanical pattern of chain not only looks more decorative and interesting, but may actually be quicker made, and with but a fraction of the tedium and monotony of the other case.

But, after all that has been admitted, the fact remains that there are many instances where a perfectly even, monotonous chain does really look best, and, unhappily, that is most frequently so in the case of the smallest sizes, which are, of course, not only by far the most laborious to make, but also, one must fear, ruinous to the eyesight.

Well, in the first place, we may rejoice to think that, even in the field of this minute labour, machines do relieve human eyes and fingers of much of the more tedious processes, and, further, we may reasonably believe that there must always be numbers of people who, while they can with patience and application learn how to do one or two comparatively difficult processes perfectly, have not got it in them to master an entire craft. Moreover, there is always a pleasure in doing that which we are conscious of being able to do well, and as to the minutest kinds of chain, so trying to the eyesight—well, let us be careful only to use them when we are quite sure that they are really necessary to the design in hand.

In other cases our little wire units are always ready to help, and in Fig. 74 are a number of different patterns mostly composed of units from Figs. 14 to 14D, with the addition of small round and oval links to connect them. Below each length of chain the unit or units from which the design grew are shown separately, and each design resulted from placing the units together experimentally until a satisfactory combination appeared.

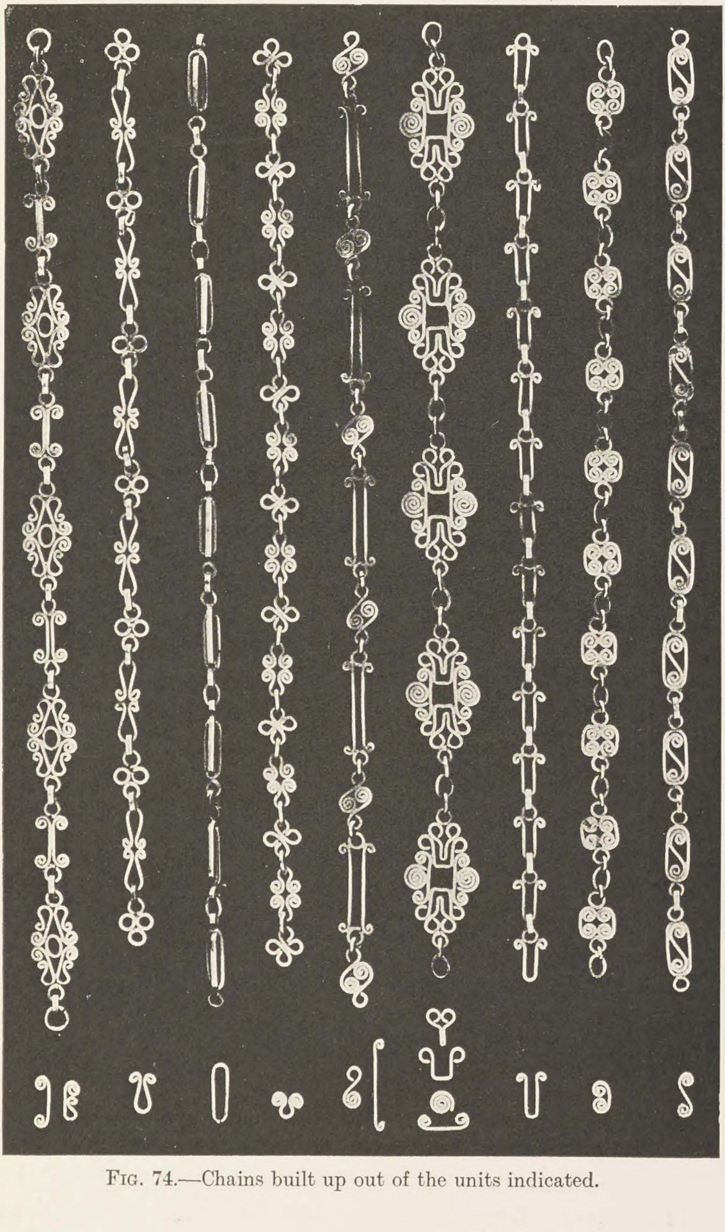


FIG. 74.—Chains built up out of the units indicated.

When a number of such links have been made ready for connecting together, it is well worth while to try

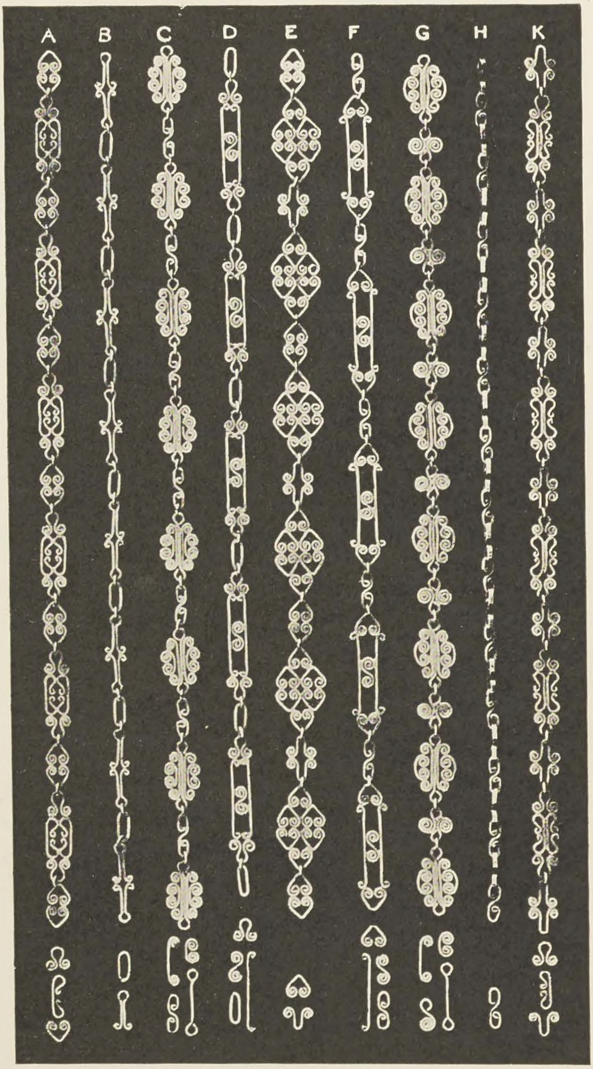


Fig. 75.—More chains built up out of the units indicated.

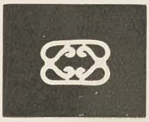
arranging the links together in various ways until they again suggest more elaborate designs, from which it will often be easy to develop quite interesting pendants and necklaces, *before* linking them up into chains.

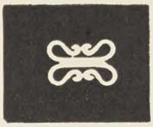
Most of the objects in the illustrations which come in the next chapter happened in that way, and if they are compared with Fig. 74, it will be seen that several of them are composed of the same identical links which, in the latter illustration, appear as chain.

In Fig. 75 there are further examples of similar, though different, ornamental chains built up out of a few units selected from Figs. 14 to 14D.

The piece in the middle (E) is interesting as being in the main composed entirely out of repetitions of a single unit , the only element of variety introduced (other than the small circular rings which connect the links) being in every alternate one of the *smaller* links, when these are made out of a pair of units of a different pattern , in order to escape excessive monotony.

The two chains A and K at the sides of this illustration will be seen to be each composed, as to their longer links, of the same units, and , and it is worth noting how entirely different the effect may be according to whether the units are placed face to face, or back to back. A further variation of these two patterns would be obtained by separating the central units of the longer links by the long, straight wire with a loop at each end, which is used in that way in two of the other examples (C and G). These, again, are instances of variety in effect, although the component parts are the same in their larger links, the only difference being that the smallest unit has its face turned outwards in C, while in G it faces inwards.





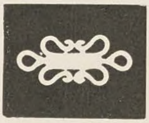
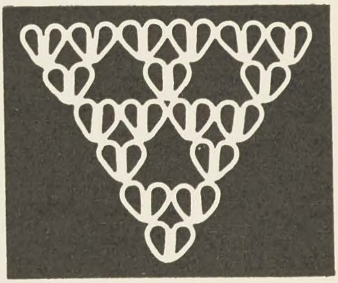


Fig. 75, H, a few links of which were shown on an enlarged scale on p. 130, is an example of what can be done in the way of making a strong, neat, and tolerably small chain from repetitions of a single unit quite by itself, each unit being linked to its fellows.

After the linking together has been done, every unit should have both of its scrolled ends neatly soldered to the shank, as a necessary safeguard, but this form of chain has the great advantage that its strength only *indirectly* depends on the solder.



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